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equations), pp. 1-7; Trigonometry (plane and spherical triangles; hyperbolic functions), 8-13; Analytic Geometry (transformation of coördinates; straight line; circle; parabola; ellipse; hyperbola; cycloid; miscellaneous curves; solids), 14-22; Differential and integral calculus, 23-38; Theoretical mechanics, 39-53; Mechanics of materials, 54-91; Hydraulics, 92-101; Heat engineering, 102-123; Electrical engineering formulæ, 124-155. Tables (logarithms of numbers, sines, cosines, tangents and cotangents; natural sines, cosines, tangents and cotangents; conversion factors; properties of saturated steam (Goodenough); pressure-entropy table for steam (Goodenough), 156-269.

La Vie universitaire à Paris. Ouvrage publié sous les auspices du Conseil de l'Université de Paris. Avec 92 photographies hors texte. Paris, Colin, 1918. Royal 8vo, 231 pp. Price 12 francs.

The two chapters of this sumptuous work which are of especial interest to the mathematician are chapter 4: "La faculté des sciences" by Maurice Caullery, 50-70; and chapter 5: "L'Ecole Normale Supérieure" by E. Lavis, 71-74. Plate 15 presents Pirou's well-known portrait of Hermite and a much less familiar portrait of Poincaré by Manuel. There are also interesting views of the Sorbonne.

Business arithmetic. By C. W. SUTTON and N. J. LENNES. Boston, Allyn and Bacon, 1918. 8vo, 6 + 466 + 8 pp. Price \$1.40.

Brief business arithmetic. By C. W. SUTTON and N. J. LENNES. Boston, Allyn and Bacon, 1918. 8vo, 5 + 297 + 6 pp. Price \$1.16.

The titles of the last twenty-one chapters of the larger work are as follows: Promissory notes, partial payments, banks and bank discount, cash balance in bank, savings accounts, stocks and shares, bonds, the stock exchange, graphic representation, domestic exchange, foreign exchange, equation of payments and accounts, property insurance, life insurance, direct taxation, income tax, United States customs, partnership, storage, building and loan associations, and depreciation.

NOTES.

The United States Ordnance Department is to publish a treatise on exterior ballistics. It is being prepared for the press under the direction of Captain Dunham Jackson.—Teubner announces the publication of: C. CRANZ, *Lehrbuch der Ballistik*. Herausgegeben unter Mitwirkung von K. Becker. Band 4: Sammlung von Zahlentafeln, Diagrammen, und Lichtbildern. 2. vermehrte Auflage, Leipzig, 1918.

It is announced that the fourth, fifth, and sixth volumes of the *Handbuch der angewandten Mathematik* edited by H. E. Timerding (Leipzig, Teubner) are to be respectively entitled: *Die graphischen Methoden der technischen Mechanik*, *Mathematische Statistik und Versicherungsrechnung*, and *Grundzüge der Astronomie*. The first three volumes, published in 1914-15, were *Praktische Analysis* by H. von SANDEN, *Darstellende Geometrie* by J. HJELMSLEV, and *Grundzüge der Geodäsie* by M. NÄBAUER.

Three bulletins have been issued by the Naval Consulting Board of the United States and the Engineering Council's War Committee of Technical Societies. In *Problems for Aeroplane Improvement*, bulletin No. 3, August, 1918, there is a "Working Bibliography," pages 19-29. This bibliography includes portions of one published by *Aviation and Aeronautical Engineering*, May 1, 1917, entitled "Two hundred books on aeronautics" by E. N. Fales. Paul Brockett's com-

prehensive volume, *Bibliography of Aëronautics* published by the Smithsonian Institution in 1910, is now being brought up to date.

Macmillan's spring announcements include an entirely new edition of CAJORI'S *History of Mathematics*; a new work in the Hedrick series, KENYON and INGOLD'S *Elements of Plane Trigonometry; A short Course in Mathematics for Freshmen* by R. E. MORITZ; and an elementary work by BERTRAND RUSSELL entitled *Introduction to Mathematical Philosophy* (published by Allen and Unwin, London)—The Cambridge University Press announces that J. H. JEANS'S *Problems of Cosmogony and Stellar Dynamics* is soon to appear.

Teubner announces the completion of F. Dingeldey's edition of the genial Fiedler's free translation of Salmon's *Conic Sections*. The first English edition was published in 1848, and the first in German in 1860. This translation has appeared in two parts since the fifth edition in 1887. Dingeldey's edition constitutes the eighth edition (1915) of the first part, and the seventh edition (1918) of the second part—a work of over 900 pages. The references to sources are very numerous.

Salmon was born at Dublin in 1819 and graduated from Trinity College there in 1841 when he immediately became a fellow and lecturer in mathematics. He was made a divinity lecturer as well in 1845. His first mathematical paper was in 1844 and his first publication in a theological subject in 1849. He was regius professor of divinity from 1866 till he became provost in 1888. He died in 1904. From Fiedler's "Zum Gedächtnis George Salmons" (pp. vi-xv of the first part) the following sentences are quoted: "He was a master in chess and was once chosen as an opponent of Morphy whom he met successfully. I have already mentioned that he was a great reader along many lines including much of a lighter character. . . . So well was he acquainted with the literature for young people, he was able to contribute to the 39th volume of the *Fortnightly Review* an interesting inquiry on the theme, 'What boys read'; he held the girls' book, *Alice in Wonderland*, in high esteem. Above all things he rejoiced in humor—both the very refined and the more rugged." In John Ossory's sketch in the *Dictionary of National Biography* occur the lines: "Hospitable and kindly, Salmon had many friends and interests. In youth a competent musician and a chess player of remarkable power, he cultivated both recreations until an advanced age. He was always an omnivorous reader (except in the two departments of metaphysics and poetry, for which he had no taste) and had a special affection for the older novelists, being accustomed to recommend the study of Jane Austen as a liberal education. The homely vigor and the delightful wit of the long letters which he was accustomed to write to his friends entitle him to rank as one of the best letter-writers of the last century."

Three parts of the *Encyklopädie der mathematischen Wissenschaften* were published in 1918: (1) Band III 1, Heft 6: M. Zacharias, "Elementargeometrie und elementare nichteuklidische Geometrie in synthetischer Behandlung." Zweiter Theil mit Zusätzen von W. F. Meyer; (2) Band III 2, Heft 7: C. Segre, "Mehrdimensionale Räume"; (3) Band VI 1 B, Heft 4: E. von Schweidler, "Atmosphärische Elektrizität"; A. Schmidt, "Erdmagnetismus und verwandte Erscheinungen." There are now eight complete volumes of the *Encyklopädie*; the two for "Arithmetik und Algebra," two of the four volumes for "Analysis," and four of the five volumes for "Mechanik" (the Registerband alone is lacking). At present an extra charge, amounting to 30 per cent. of old prices, is made for all parts of the *Encyklopädie*.

Teubner has recently published two additional parts of *Materialien für eine*

wissenschaftliche Biographie von Gauss—Heft 4: *C. F. Gauss als Zahlenrechner* von A. Galle (Pp. 1–24); Heft 5: *C. F. Gauss als Geometer* von P. Stäckel (Pp. 25–142), 1918. Earlier parts were—Heft 1: *Ueber Gauss' zahlentheoretische Arbeiten* von P. Bachmann, 1911; Heft 2: *C. F. Gauss, Fragmente zur Theorie des arithmetisch-geometrischen Mittels aus den Jahren 1797–1799*, and Heft 3: *Ueber Gauss' Arbeiten zur Funktionentheorie*, von L. Schlesinger, 1912.

The first part of the tenth volume of Gauss' collected works appeared in 1917. It is a volume of nearly 600 pages and is entitled "Nachträge zur reinen Mathematik. Nachbildung und Abdruck des Tagebuchs." The second part of volume 10 (Aufsätze über Gauss' wissenschaftliche Tätigkeit auf den Gebieten der reinen Mathematik—Zahlentheorie, Funktionentheorie, Algebra, Geometrie, Variationsrechnung) and the first part of volume 11 (Nachträge zur Physik, Astronomie und Chronologie) are in the press. The second part of volume 11 which is in course of preparation is to contain "Aufsätze über Gauss' wissenschaftliche Tätigkeit auf den Gebieten der angewandten Mathematik." The twelfth and last volume is to be biographical.

The following quotation is a bit of personal testimony to the value of mathematical study, from the pen of one who has become world renowned for the clarity and beauty of his literary style:

"Geometry was to teach me the logical progression of thought; it was to tell me how the difficulties are broken up into sections which, elucidated consecutively, together form a lever capable of moving the block that resists direct efforts; lastly, it showed me how order is engendered, order, the base of clarity. If it has ever fallen to my lot to write a page or two which the reader has run over without excessive fatigue, I owe it, in great part, to geometry, that wonderful teacher of the art of directing one's thought. True, it does not bestow imagination, a delicate flower blossoming none knows how and unable to thrive on every soil; but it arranges what is confused, thins out the dense, calms the tumultuous, filters the muddy, and gives lucidity, a product superior to all the tropes of rhetoric.

"Yes, as a toiler with the pen, I owe much to it. Wherefore my thoughts readily turn back to those bright hours of my novitiate, when, retiring to a corner of the garden in recreation-time, with a bit of paper on my knees and a stump of pencil in my fingers, I used to practise deducing this or that property correctly from an assemblage of straight lines. The others amused themselves all around me; I found my delight in the frustum of a pyramid." From *The Life of the Fly with which are interspersed some chapters of autobiography* by J. HENRI FABRE, translated by A. T. de Mattos. New York, Dodd, Mead and Co., 1913, Chapter 12: "Mathematical memories: Newton's binomial theorem."

ARTICLES IN CURRENT PERIODICALS.

AMERICAN JOURNAL OF MATHEMATICS, volume 40, no. 4, October, 1918: "Theta modular groups determined by point sets" by A. B. Coble, 317–340; "On the asymptotic solution of the non-homogeneous linear differential equation of the n th order—a particular solution" by W. V. N. Garretson, 341–350; "A collineation group isomorphic with the group of the double tangents of the plane quartic" by C. C. Bramble, 351–365; "Proof of Pohlke's theorem and its generalizations by affinity" by A. Emch, 366–374; "Arithmetical theory of certain Hurwitzian continued fractions" by D. N. Lehmer, 375–390.

BULLETIN OF THE AMERICAN MATHEMATICAL SOCIETY, volume 25, no. 4, January, 1919: "On the evaluation of the elliptic transcendents η_2 and η_2'' " by Harris Hancock, 150–157; "On plane algebraic curves with a given system of foci" by Arnold Emch, 157–161; "Quadratic systems of circles in non-Euclidean geometry" by D. M. Y. Sommerville, 161–173; "Continuous sets that have no continuous sets of condensation" by R. L. Moore, 174–176; "Derivativeless continuous functions" by M. B. Porter, 176–180; Review by R. D. Carmichael of Picard's *Les*